CHAPTER 5 – REASONABLY FORESEEABLE DEVELOPMENT AND CUMULATIVE IMPACTS ANALYSIS

5.1 INTRODUCTION

Cumulative effects are the impacts on the environment that result from the incremental addition of all past, present, and reasonably foreseeable future actions to the Proposed Action or alternative. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time.

This chapter discusses cumulative impacts in terms of the incremental effects to specific resources that would occur from implementation of the Proposed Action or the alternatives in conjunction with impacts from other past, ongoing, recently approved, and reasonably foreseeable future actions, and considers these impacts in the context of ecosystem management in the Uinta Basin. For example, development paths are often directly tied to market fluctuations and have focused primarily on short-term development due to discounted values of future commodities (including natural resources). However, a given development project may have broader resource implications when analyzed in relation to other actions in the region. Table 5-1 summarizes existing planning and environmental documentation that is pertinent to this analysis.

While much of this discussion focuses on cumulative impacts that are adverse, it should be noted that beneficial cumulative impacts may also occur. For example, some cumulative impacts to socioeconomics would be beneficial; they would include increased government royalties and revenues derived from oil and gas production, additional employment opportunities in the region, and decreased reliance upon foreign sources of energy as domestic supplies are developed.

Table 5-1. Existing Major Planning and Environmental Documents

Document	Date
Veritas DGC Land, Inc. 2-D Seismic Exploration Environmental Assessment, Uintah County, Utah. EA # 2002-21.	2002
Questar Gas Management Environmental Assessment Buck Canyon - Seep Ridge Road Pipeline, Uintah County, Utah. EA # 1998-47.	1998
CNG Producing Company Environmental Assessment, River Bend and West Willow Creek Units, Uintah County, Utah. EA # 1997-49.	1998
Enron Oil and Gas Company Environmental Assessment Chapita Wells Unit, Uintah County, Utah. EA # 1997-48.	1998
Coastal Oil & Gas Corporation Natural Buttes Unit Environmental Assessment, Uintah County, Utah. EA # 1997-13.	1997
Snyder Oil Corporation Horseshoe Bend Waterflood Project Environmental Assessment, Uintah County, Utah. EA # 1996-67.	1997
Inland Resources Monument Butte - Myton Bench Waterflood Environmental Assessment, Duchesne and Uintah Counties, Utah. EA # 1996-61.	1997

Table 5-1. Existing Major Planning and Environmental Documents

Document	Date
Chevron Brennan Bottom Unit Waterflood Project, Uintah County, Utah. EA # 1996-59.	1996
Environmental Assessment for Snyder Oil Corporation's Leland Bench Oil Field, Uintah County, Utah.	1995
Monument Butte / Myton Bench Environmental Assessment, Duchesne and Uintah Counties, Utah. EA # 1994-77.	1995
Diamond Mountain Resource Area Resource Management Plan and Environmental Impact Statement.	1994
Coyote Basin Oil Field Environmental Assessment, Uintah County, Utah. EA # 1993-53.	1993
Wonsits Valley Federal Unit and Gypsum Hills Federal Unit Infill Drilling Project. EA # 1992-36.	1992
Final Environmental Impact Statement and Record of Decision on the Book Cliffs Resource Management Plan.	1985
Federal Oil Shale Management Prog Draft Environmental Impact Statement.	1983
Utah Combined Hydrocarbon Regional Draft Environmental Impact Statement.	1983
Final Environmental Impact Statement, Uinta Basin Synfuels Development.	1982
Final Environmental Impact Statement Moon Lake Power Plant Project, Units 1 and 2.	1981

5.2 REASONABLY FORESEEABLE FUTURE DEVELOPMENT

This document incorporates all key projects for ongoing, proposed, and potential actions within Duchesne and Uintah Counties, defined as the Cumulative Impact Analysis Area (CIAA). The Reasonably Foreseeable Development (RFD) projections and assumptions are made only for the purpose of projecting future cumulative impacts and are not part of the Proposed Action. Inclusion in the RFD scenario does not constitute a decision or a commitment of resources.

5.2.1 OIL AND GAS ACTIVITY

Oil and gas development is a major resource development activity within the Uinta Basin. Development commenced during the early 1900s and is continuing at record or near record levels. Table 5-2 summarizes the number of wells and wells status within Duchesne and Uintah Counties. The PI/Dwights Wells; Utah Division of Oil, Gas, and Mining; and the BLM Automated Fluid Minerals Support System databases were reviewed to determine present well status. These databases also were used to formulate the assumptions listed below.

Planned, ongoing, and anticipated future projects, including the Proposed Action, are summarized in Table 5-3. The anticipated number of APDs resulting from these projects is 4,204. The number of APDs on which surface disturbance and/or drilling is occurring is 73% of the number of APDs submitted (BLM 1998b).

Table 5-2. Present and Historic Well Status Summary for Duchesne and Uintah Counties, Utah

Well Status	Number of Wells
Drilling and Drilling Shut In	30
Producing Oil Wells	1,432
Producing Gas Wells	1,515
Shut-in Oil Wells	247
Shut-in Gas Wells	196
Service Wells [Injection, Disposal, Water, etc.]	420
Temporarily Abandoned	209
Abandoned	355
Plugged and Abandoned	1,351
TOTAL WELLS	5,755

Source: BLM 2002a.

Table 5-3. Reasonably Foreseeable Future Actions (Next 10 to 15 Years)

Project	Status	Wells Planned	Wells Drilled
Natural Buttes Unit	Ongoing	875	639
Monument Butte Unit	Ongoing	300	219
Brennan Bottom Unit	Ongoing	17	12
Horseshoe Bend Unit	Ongoing	14	10
Chapita Wells Units	Ongoing	96	70
River Bend / West Willow Creek Units	Ongoing	182	133
Uinta Basin Natural Gas Project	Proposed	969	707
Island Unit	Future	97	71
Hill Creek Unit	Future	54	39
White River	Future	300	219
West Riverbend	Future	600	438
Other Oil Well Projects	Future	300	219
Other Natural Gas Projects	Future	400	292
TOTAL NUMBER		4,204	3,068

Source: BLM 1998b.

The following assumptions were formulated after review of the databases listed above, based partially upon BLM field experience in the area. Note that these assumptions pertain to past and future development within the region and in many cases differ from those used in the Chapter 4 impacts analysis of the Proposed Action.

Analysis assumptions:

- 73% of approved APDs are drilled.
- 75% of producing wells are producing at any given time.
- Average well life: 25 years.
- Time for successful reclamation of surface disturbance: 30–40 years for sagebrush vegetation and 75–150 years for pinyon/juniper vegetation.
- The numbers of shut-in wells returning to producing status equal the number of producing wells being placed into shut-in status.
- 23 existing compressor sites, with average of 2 acres of disturbance per site.
- 15 RFD compressor sites.
- Miles of gas gathering pipeline systems equal the miles of road. Only 10% of the gas gathering pipeline systems will be buried.
- Oil secondary recovery project water pipeline systems equal road disturbance.
- Access road construction: 0.18 miles per well (1.5 acres per well).
- Well pad construction: 2.0 acres per well (0.8 acres per well will be reclaimed within one year after completion of operations).
- Existing pipeline systems:
  - Gathering/Injection lines: 0.47 acres per producing well.
  - Transportation lines: 0.15 miles per producing well, 0.79 acres per producing well.
- Future transportation systems:
  - Applications: 147 miles disturbing 1,340 acres.
  - RFD: 100 miles disturbing 910 acres.
- Power lines:
  - 10% of producing and shut-in wells will have electrification.
  - Where power lines are present, the length will approximate access road length.
  - Existing activity will be 85 miles.
  - RFD will be 56 miles.
  - There will be 0.25 acres disturbed per mile.

Surface disturbance within the CIAA has been and will continue to be largely the result of oil and gas activities. Table 5-4 lists oil and gas-related surface disturbance for existing, proposed, and future projects. Emissions data for the existing compressors are given in Table 5-5.

5.2.2 GILSONITE MINING

Three companies are currently extracting and processing gilsonite within the Uinta Basin: American Gilsonite Corporation, Lexco, and Ziegler Chemical & Mineral Corporation. During 1997, 69,187 tons of gilsonite were produced. This is an increase of slightly over 9,000 tons from 1996 figures. The bulk of this production was from private and state leases.

Table 5-4. Related Oil and Gas Activity Surface Disturbance

	Present and Historic Activity				Future Activity				Total CIAA			
	Short Term		Life of Activity		Short Term		Life of Activity		Short Term		Life of Activity	
Type of Disturbance	Miles	Acres	Miles	Acres	Miles	Acres	Miles	Acres	Miles	Acres	Miles	Acres
Producing Oil Wells	- -	1146	- -	1718	- -	793	- -	1189	- -	1939	- -	2907
Producing Gas Wells	- -	1212	- -	1818	- -	644	- -	966	- -	1856	- -	2784
Shut-in Oil Wells	- -	198	- -	296	- -	99	- -	149	- -	297	- -	445
Shut-in Gas Wells	- -	157	- -	235	- -	149	- -	223	- -	306	- -	458
Service Wells	- -	336	- -	504	- -	198	- -	98	- -	534	- -	602
Temporarily Abandoned Wells	- -	167	- -	251	- -	198	- -	298	- -	365	- -	549
Abandoned Wells	- -	284	- -	426	- -	248	- -	372	- -	532	-	798
Plugged and Abandoned Wells	- -	1080	- -	1621	- -	149	- -	223	- -	1229	- -	1844
Access Roads	- -	- -	1043	8688	- -	- -	558	4647	- -	- -	1601	13335
Pipeline Gathering Systems	- -	- -	- -	1906	- -	- -	- -	1223	- -	- -	- -	3129
Transportation Pipeline Systems	608	1057	608	2147	247	750	247	1500	855	1807	855	3647
Compressor Stations	- -	- -	- -	46	- -	- -	- -	30	- -	- -	- -	76
Power Lines	- -	- -	73	18	- -	- -	56	14	- -	- -	129	32
TOTALS	608	5637	1724	19674	247	3228	861	10932	855	8865	2585	30606

Source: BLM 1998b, 2002a.

Table 5-5. Identified Uinta Basin Compressor Sites and Available Annual Emissions Data

Site	Company	Description	County	PM_{10} (tpy)	SO_2 (tpy)	NO_x (tpy)	CO (tpy)	VOC (tpy)
1998 DATA								
Natural Buttes	Coastal Oil & Gas	550 HP Compressor; Ajax DPC-280	Uintah	0	0	4.81	3.03	9.16
		1100 HP Natural Gas Compressor		0	0	20.76	20.76	7.79
		1 - 550 HP; 2 - 80 HP; 1 - 60 HP Compressors		NA	NA	NA	NA	NA
		360 HP Compressor		0.06	0	14.25	15.80	7.67
		Caterpillar 351 Compressor		0	0	20.76	20.76	7.79
		1 - 550 HP; 2 - 80 HP; 1 - 60 HP Compressors		NA	NA	NA	NA	NA
Site 2		1 - 140 HP; 1 - 750 HP Engines		0.06	0	39.40	39.40	14.98
		550 HP Compressor		0.06	0	8.69	5.21	2.17
Site 1		3 - 1100 HP Compressors		NA	NA	NA	NA	NA
West Compressor		Caterpillar 1100 HP TALE Compressor	Uintah	0.03	0	19.97	19.97	7.49
Altamont Gas Plant	El Paso Field Operations Company	9 - 1030 HP Engines; Power Inlet Refrigeration and Sales Compressors	Duchesne	5.46	0.29	1626.26	182.78	122.40
Altamont West		1 - 1350 HP; 2 - 1030 HP Compressors	Duchesne	1.60	0.09	606.84	59.57	43.16
Altamont South		1 - 1350 HP; 2 - 1030 HP Compressors	Duchesne	2.37	0.13	884.94	59.57	56.80
Altamont East		1 - 1350 HP; 2 - 1030 HP; 1 - 1800 HP Compressors		1.60	0.09	606.84	59.57	43.52
Antelope Creek	Petroglyph Op. Co.	600 HP Waukesha Compressor	Duchesne	NA	NA	NA	NA	NA
Dragon Station	MAPCO	3 - 1050 HP Solar Saturn T-1302 Compressors	Uintah	6.96	0.10	61.11	98.55	10.35

Table 5-5. Identified Uinta Basin Compressor Sites and Available Annual Emissions Data

Site	Company	Description	County	PM_{10} (tpy)	SO_2 (tpy)	NO_x (tpy)	CO (tpy)	VOC (tpy)
24B Gas Plant	Chevron U.S.A.	2 - 1200 HP Turbines	Uintah	1.76	0.10	18.26	4.40	43.88
SW/SW of S21 of T8S, R17E	Interline (Questar)	1 - 400 HP Waukesha F-18-GL	Duchesne	0	0	16.88	8.44	4.22
NW/NW of S34 of T8S, R18E		1 - 80 HP; 1 - 40 HP Compressors	Uintah	0	0	11.56	9.99	0.16
Ashley Compressor	Inland	1 - 140 HP Ajax DPC-162 Compressor	Duchesne	NA	NA	14.58	4.04	8.10
Monument Butte Facility		1 - 312 HP Ajax DPC-360-LE Compressor	Duchesne	NA	NA	7.18	7.18	12.26
River Bend Station	Questar	1 - Waukesha L-5790GL Compressor 1 - Waukesha L-7042GL Compressor	Uintah	NA	NA	19.86	35.08	13.24
Pariette Compressor		1 - 415 HP Caterpillar Compressor	Duchesne	0.01	NA	3.49	2.02	14.32
2002 DATA								
Altamont Gas Plant	El Paso Field Operations Company	9 - 1030 HP Engines; Power Inlet Refrigeration and Sales Compressors	Duchesne	0.58	NA	103.13	231.84	1.84
Altamont West		1 - 1350 HP; 2 - 1030 HP Compressors	Duchesne	0.34	NA	18.58	41.75	0.33
Altamont South		1 - 1350 HP; 2 - 1030 HP Compressors	Duchesne	1.69	NA	110.54	155.76	3.43
Altamont East		1 - 1350 HP; 2 - 1030 HP; 1 - 1800 HP Compressors	Duchesne	2.05	NA	80.66	105.68	2.33
Wonsits Compressor Station	Questar	5 - 3750 HP Engines	Uintah	10.20		53.55	NA	30.60
Natural Buttes	Colorado Interstate Gas Company	5-compressor engines, 4-combustion turbines	Uintah	NA	NA	309.00	NA	185.00

Table 5-5. Identified Uinta Basin Compressor Sites and Available Annual Emissions Data

Site	Company	Description	County	PM_{10} (tpy)	SO_2 (tpy)	NO_x (tpy)	CO (tpy)	VOC (tpy)
24B Gas Plant	Chevron U.S.A.	3 - 997 HP compressor engines; 1 - 324 HP compressor engine; 1 - amine unit	Uintah	NA	27.70	2.25	NA	16.30

Nomenclature:

PM10 - Particulate Matter

SO2 - Sulfur Dioxides

NOx - Nitrous Oxides

CO - Carbon Monoxide

VOC - Volatile Organic Compounds

na – Not applicable

Volumes are in tons per year (tpy).

The horse power descriptions are for the engines required to run the compressors.

This is a selected list but is accurate to the Utah Division of Air Quality's Data

Source (1998 data): Utah Division of Air Quality: personal communication to BLM Vernal Field Office, March 10 1998.

Source (2002 data): Utah Division of Air Quality, Carol Nielsen: personal communication to SWCA Environmental Consultants, November 14, 2005 and US EPA, Larry Svoboda: personal communication to SWCA Environmental Consultants, September 25, 2003.

Note: The information presented in the table represents the most current data available. Data were available for some facilities from 2002; data for other facilities were only available from 1998. The data from 1998 represented the most complete data set available at the time and was used in the air quality modeling discussed in this document. Additional emissions data were requested from UDAQ in November 2005. With the exception of the data for the Altamont sites presented in the preceding table, no new or substantially different data are available to this effort at this time.

According to Utah Division of Oil, Gas, and Mining records in 1997, there were 122 acres of disturbance related to gilsonite production operations. If production of gilsonite rises at an average rate of 2% a year, total surface disturbance associated with the mining activity would be 180 acres by 2010.

5.2.3 PHOSPHATE

SF Phosphate Ltd. is the only producing phosphate mine in the CIAA. In 1997, the company reported 160 acres of unreclaimed land disturbances associated with their mining. Phosphate mining operations in the CIAA primarily affect the Park City Formation of the Paleozoic Era (considered a "Condition 2" formation) according to the BLM's paleonotological formation sensitivity classification (see Table 3-9 for a description of this ranking system).

It is anticipated that no other companies will begin mining before 2010-2015. It is further anticipated that SF Phosphate Ltd. will continue to have 160 acres of unreclaimed surface disturbance.

5.2.4 POWER GENERATION

Approximately 10 miles north of the RDG Project Area, Deseret Generation and Transmission Company owns and operates the Bonanza Power Plant. The Bonanza Plant has an operating capacity of 460 megawatts (MW) using one coal-fired unit. Blue Mountain Energy, a subsidiary of Deseret, operates a coalmine near Rangely, Colorado, which provides the coal for the Bonanza Power Plant.

The original state-approved PSD permit was issued in 1983 for the Bonanza Plant. As part of a re-permitting exercise on certain issues in 1994, visibility modeling was performed. Ambient air quality data (for SO_2, CO, NO_x, and particulate matter) were collected at the plant until 1993 in support of the permitting process. However, impacts on visibility to the nearby Dinosaur National Monument were not determined.

5.2.5 OTHER RESOURCE USES

5.2.5.1 LIVESTOCK GRAZING

Livestock grazing is a permitted use of public lands within the Vernal District. It is reasonable to expect some minor changes in use over the next few years, but over the longer term, livestock grazing on public lands is likely to continue with no significant changes. Any such changes would be in direct response to regional cattle and sheep market prices, a factor over which the BLM has no control.

5.2.5.2 VEGETATIVE TREATMENTS

During the period of 1980-1990, approximately 1,280 acres within sagebrush vegetation communities and approximately 1,700 acres within the pinyon-juniper woodlands of the

Diamond Mountain Resource Area were treated by the BLM using prescribed fire. Such activities were conducted to either maintain native vegetation diversity or provide a more desirable vegetation matrix of plant species for watershed protection and wildlife habitat enhancement. Chaining and reseeding projects within the pinyon-juniper woodlands were conducted in the late 1960s and throughout the 1970s on approximately 11,600 acres. Due to high costs and the public's increasing disfavor, chainings during the 1980s declined significantly, with only 1,000 public acres treated during the decade (BLM 1994, 1990 Diamond Mountain Management Situation Analysis [MSA]).

Prescribed burning will continue as BLM's primary method of vegetative treatment for the Vernal District. This treatment method results from the BLM's acknowledgement of and directives to use fire as an integral tool to maintain and/or improve native rangelands. To meet management objectives, it is reasonable to expect that the BLM will increase to 2,000 the average number of public acres burned annually over the next 5 years. These fires will be conducted throughout the Vernal District and will be in strict compliance with the defined prescriptions, including air quality restrictions, as outlined in project-specific burn plans.

The Diamond Mountain Resource Area sold 12,750 cords of fuel wood during the period of 1985-89 (BLM 1994, 1990 Diamond Mountain MSA). The purpose of such sales was to meet the local public's need for fuel wood, as well as to maintain vegetation diversity and overall health. Approximately five sites, ranging in size from 50 to 100 acres, were sold each year. Access to these sites was available using existing public roads and temporary two-track vehicular trails within the sale area. Upon completion of the sale, the site and any identified, unneeded access trails were revegetated.

It is reasonable to assume that the VFO will continue to provide fuel wood harvest areas at the continued rate of 5 sales, involving approximately 100 acres each, for the next 5 years. Upon completion of the fuel wood harvest, unneeded access trails will be closed and reclaimed. For the sake of analysis, it is assumed that 0.25 miles (1.0 acre) of new major access could be involved with each sale, and approximately 0.50 miles (1.1 acres) of temporary access routes could be involved for each sale.

5.2.5.3 WATER STRUCTURES

Water reservoirs, with an estimated capacity of 1 acre-foot, have been constructed throughout the Vernal District at all elevations. Until 1990, the VFO constructed and/or maintained approximately 25 reservoirs a year. Since that time, there has been a gradual decline in the number of reservoirs either constructed or maintained in the District. It is reasonable to expect water will continue to be needed by foraging animals and that the BLM will either construct or permit others to construct and/or maintain such structures at the rate of 10 reservoirs per year, thus involving an estimated 15 acres per year.

Installation of water pipeline systems, laid to improve animal distribution, averaged one per year over the period of 1975-1985 in the Vernal District. Since that time, primarily due to the high cost of maintenance, pipeline systems have not been constructed. It is reasonable to assume that

over the next 5 years, 3 pipeline systems, totaling approximately 10 miles of pipelines, could be constructed, thus involving approximately 36 acres.

5.2.5.4 BLM-MAINTAINED ROADS

On average, the District maintains approximately 170 miles of dirt roads annually. These roads provide needed access for the general public. The maintenance work involves grading, pulling in gravels and dirt from the roadsides, and reconstructing needed cutouts, berms, and ditches as needed. This trend is expected to continue indefinitely.

5.3 CUMULATIVE IMPACTS RELATED TO ALTERNATIVE 1 – THE PROPOSED ACTION

Oil and gas development is, has been, and will likely continue to be a prominent use of the area. Most of the surface disturbance and human activity are associated with oil and gas development. Cumulative effects to natural resources contributed by the Proposed Action would occur wherever project impacts are not completely mitigated. The primary issues for the cumulative impacts analysis related to the Proposed Action include wildlife resources (including sensitive species), air quality, recreation, and visual resources.

Table 5-6 presents a synopsis of the change agents that affect a given resource with respect to each of the major activities presented in Section 5.2, Reasonably Foreseeable Future Development. Table 5-6 simplifies these relationships and does not reflect the magnitude or intensity of a cumulative effect.

5.3.1 AIR QUALITY

Air quality in the region would be incrementally and cumulatively affected by the development of approximately 4,204 additional natural gas wells. Visibility degradation may occur as a result of the Proposed Action due to precursor gases being emitted from the proposed sources and increased particulates from roadways and drilling operations.

However, as some wells are being drilled and completed, others are being abandoned and their pads and access roads reclaimed. The effects to air quality and visibility from drilling and completing the wells described in the RFD would reflect those described for the project. The UDEQ/DAQ and NPS have indicated that the air quality within the Uinta Basin is at present not of great concern (Personal communication with V. Pirrello, ENSR, April 1998; personal communication with S. Petersburg, Fire Manager, Dinosaur National Monument, June 1998).

EPA and UDEQ/DAQ policy has been to consider oil and gas producing wells as individual facilities. The spacing of proposed wells (40-acre to 160-acre spacing) would provide adequate dispersal of any emissions from active well-heads. The cumulative effect of the Proposed Action (development of several future gas wells) would be difficult to detect due to the small quantity of emissions and the dispersal of those emissions. The background concentrations of VOCs (regulated as O_3) established by the UDEQ/DAQ are well below the NAAQS (see Table 3-3),

Table 5-6. Change Agents Affecting Resources by Reasonably Foreseeable Future Activities

Activity/Resource	Oil and Gas Activities	Gilsonite Mining	Phosphate Mining	Power Generation	Other Resource Uses
Air Quality	Compressor needs Particulate emissions (short-term) Fugitive well-head emissions (limited)	Particulate emissions (limited) VOC emissions (limited)	Particulate emissions (limited)	10,000 lb/yr NOx VOC, CO, SO2 emissions Particulate emissions	Burns Recreation (OHV use) Particulate emissions Timber sales
Soils and Watersheds	Land disturbance Increased erosion and soil loss Increased sedimentation to waterbodies	Land disturbance Erosion from mine sites (limited)			Burns Timber sales Grazing Recreation (OHV use)
Vegetation, Range, and Sensitive Plant Species	Land disturbance Noxious weed infestations associated with disturbance	Land disturbance (limited)	Land disturbance (limited)		Burns: short-term loss, long-term benefit Timber sales Grazing Recreational collecting of sensitive plant species (limited)
Wildlife and Sensitive Species	Land disturbance Habitat reduction Prey reduction Fragmentation Increased human activity (operations) Increased public access	Land disturbance Habitat loss (limited)	Habitat loss (limited)		Recreation (hunting; limited) Grazing (competitive AUM allotments) Burns: short-term loss, long-term benefit Timber sales (limited) Water structures (benefit)

Table 5-6. Change Agents Affecting Resources by Reasonably Foreseeable Future Activities

Activity/Resource	Oil and Gas Activities	Gilsonite Mining	Phosphate Mining	Power Generation	Other Resource Uses
Cultural Resources	Land disturbance Increased public access Additional data collection	Land disturbance (limited) Additional mining at NRHP-eligible sites	Land disturbance (limited)		Recreational collecting Timber sales activities Facility development (limited)
Paleontological Resources	Bedrock disturbance Increased public access Additional data collection	Bedrock disturbance (limited)	Bedrock disturbance (limited)		Recreational collecting
Recreational Resources	Construction activity (White River corridor) Noise Visibility				Recreational development (benefit)
Visual Resources	Land disturbance Construction activity (short-term)			Particulate emissions (visibility)	Burns Timber sales
Wilderness Characteristics	Land disturbance Construction activity Noise Visibility				Recreational motor vehicle use of well roads

indicating that current activities in the region have not significantly impacted the ambient air quality. The incremental effect of adding emissions from the Proposed Action (which does not include compression) to these background concentrations would not affect the attainment of NAAQS in the Uinta Basin.

To assess the cumulative effects of the RFD, records were reviewed at the UDEQ/DAQ offices in Salt Lake City, Utah. This review was specifically concerned with impacts from large, stationary, internal combustion sources, such as compressor station engines and turbines (collectively, drivers). As mentioned in Section 4.3.2.1, volatile organic compound (VOC) emissions would potentially occur during gas compression, though VOC release from well operations was unlikely. Table 5-5 contains the emissions data from 1998 for the 35 internal combustion engines and 5 turbines for which data were available at the time this report was being completed and identifies 12 compressors (located at 4 sites) for which emissions data were unavailable at the time of this report.

Using the data available, an analysis was performed to quantify emissions from compressor drivers, which range from 40 horsepower (HP) to 1,800 HP. Since the modeling was completed in 2001, more current data have become available from UDAQ and EPA for a small number of facilities. While these additional data have been included in Table 5-5, they do not represent a complete dataset, and total emissions cannot be compared directly with the 1998 emissions data to determine regional trends in emissions.

It also is stated in the RFD scenario outlined by the BLM that potentially 15 new compressor stations (assumed as single-engine facilities) may need to be constructed within the region (BLM 1998b). [Note: the RFD of 15 compressor stations for the CIAA is based on 1998 data, which represents the most current data available at the time. While some emissions data are now available for some existing sources from 2002, they do not represent as complete a dataset as that for 1998. Thus, the specific baseline information utilized for the modeling exercise is contained in the 1998 data section of Table 5-5.]

The primary emissions generated from compressor drivers are oxides of nitrogen (NO_x) and carbon monoxide (CO). Emissions of nitrogen dioxide (NO_2), typically assumed to comprise 75% of NO_x emissions, based on EPA methodology, are the greatest concern with regard to the projected compression needs in the region. NO_2 emissions from operation of a typical compressor engine were modeled for downwind locations using the SCREEN3 model. The configuration of the compressor driver[1] is given below:

Type: Internal combustion engine (reciprocating)
Horsepower: 1,000
Fuel: Natural gas
Operational Schedule: 8,760 hours (full-time operation)
Configuration: 4-Stroke, lean-burn, spark ignition, uncontrolled

[1] This type of compressor may be subject to 40 CFR 63 subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (proposed December 2002), and as such may require emission controls.

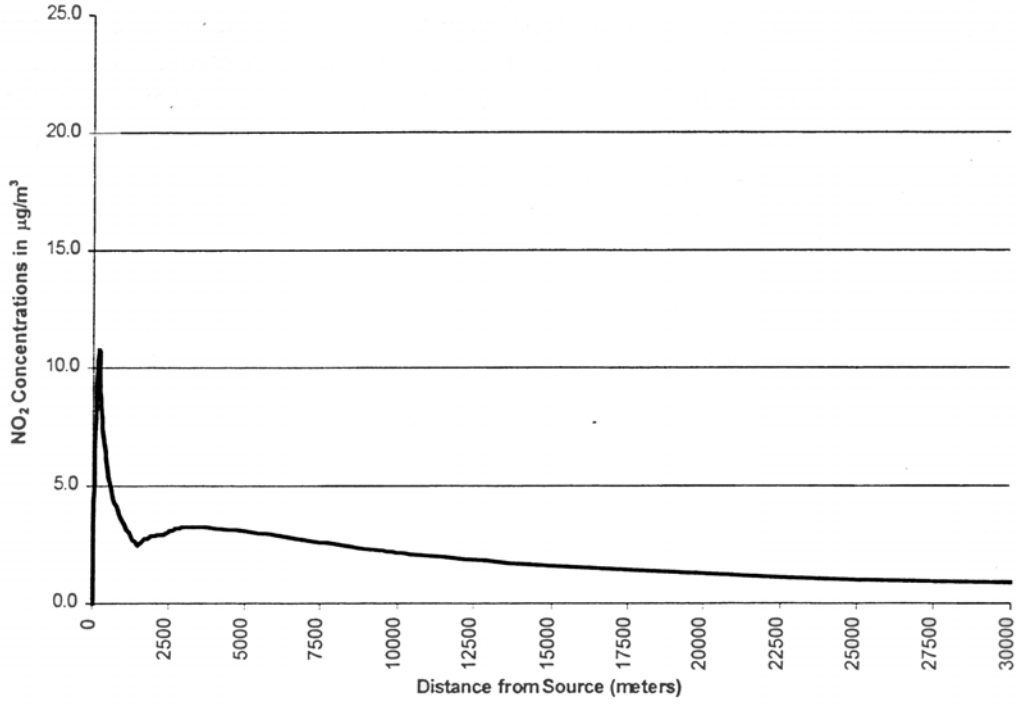
The analysis indicates that downwind concentrations of NO_2 drop off sharply at approximately 1 km from the source, to approximately 2.5 μg/m³, and continue to slowly drop off to below 1.0 μg/m³ at approximately 20 km from the source (Figure 5-1). The maximum annual impact of 11.35 μg/m³ occurs at 166 m from the source, and rapidly falls off from that point.

The emissions rate for the representative compressor driver, taken from the EPA's *AP-42, Fifth Edition, Compilation of Air Pollutant Emission Factors* (EPA 1995), is 3.276 grams per second, or roughly 114 tons per year, of NO_x. If 75% of that emission is NO_2, the tonnage per year of NO_2 (the regulated pollutant) is 85 tons per year. Therefore, for 15 compressor drivers of identical configuration, the total NO_2 emissions would be 1,275 tons per year. This would be a very conservative estimate of NO_x emissions, since new technology in the design and control of emissions from newer engines typically yields a much smaller emissions rate. The total tonnage per year of NO_x, as presented in Table 5-5, for the existing compressor drivers (1998 data) is 4,006, which translates to 3,004 tons per year of NO_2. The addition of the 15 future compressor drivers yields a total NO_2 impact of 4,279 tons per year.

For the sake of comparison, the Bonanza Power Plant, operated by Deseret Generation & Transmission, has a permitted emissions limit (by Utah Approval Order DAQE-186-98, dated March 16 1998) of 10,029.83 tons per year of NO_x (or, from the analysis, 7,522 of NO_2). Emissions from the compression facilities, comprising 19 facilities with available data (1998b) and 15 projected facilities, are only 57% of the magnitude of emissions from the Bonanza Power Plant. The maximum visibility impacts from NO_x emissions at the Bonanza Power Plant have been observed during periods of strong atmospheric stability and light winds. However, the proposed compressors are unlikely to reach this level of visibility impacts, due to the reduced emissions projected from use of improved technology and design available in new compressor engines. Additional mitigation could be achieved using state-of-the-art, clean-burn compressor engines with emissions of approximately 1g/HP-hr.

Under the provisions of 40 CFR 63 for NESHAP and MACT requirements, any source that emits or has the potential to emit 10 tons per year or more of any hazardous air pollutant is considered a major source; requires a Title V, Part 71 operating permit review and permit; and must install and operate control equipment to control air emissions as required by this subpart. Under these same provisions, glycol dehydration units emitting less than 0.9 mg/year (1 ton/year) benzene are considered "small," and the MACT floor identified is no control.

The potential for all of the dehydrators and compressor stations in the proposed Project Area to emit was modeled as part of the air quality technical report prepared for this EIS (Trinity Consultants 2002). Total HAP emissions modeled for all project-related sources were projected to be less than 1.0 ton per year; total benzene emissions were projected to be less than 0.2 tons per year. The proposed project sources are, therefore, not considered major sources under the above provisions.



Source: ENSR 1998. Using EPA's AP-42 Emission Factor Guidance and SCREEN-3 approved model.

RESOURCE DEVELOPMENT GROUP
ENVIRONMENTAL IMPACT STATEMENT

Figure 5-1

Annual NO_2 Production from a Typical RFD Compressor Driver

Figure 5-1. Annual NO_2 production from a typical RFD compressor driver.

The existing compressor stations in this analysis are scattered throughout the Uinta Basin. Their spacing and placement greatly reduce the cumulative impacts from these sources due to dispersion. Although it is not possible to quantify the effects to air quality (whether project-specific or cumulative) from the RFD without knowledge of station location and engineering specifications, the UDEQ/DAQ indicated that 15 stations could receive New Source Permits without exceeding PSD criteria, given proper siting and dispersion of emissions (personal communication with V. Pirrello, ENSR, April 1998).

Other than emissions from compressor engines, oil and gas-related sources that could contribute to visibility impairment include particulate emissions (PM_{10} and $PM_{2.5}$), fugitive VOCs from wellheads, and NO_x emissions from mobile construction sources. Similar to the project impacts discussed in Section 4.3, Air Quality, cumulative visibility impacts from particulates would be short-term and localized to where the surface disturbance or drilling is occurring. The cumulative effects to regional visibility from fugitive wellhead emissions are considered negligible, well below applicable PSD Class I threshold levels. The NO_x emissions from mobile sources also would be short-term and localized to project construction areas.

Other elements of the RFD include gilsonite and phosphate mining, as well as controlled burns, logging, and recreational activities on federal land. Records review at the UDEQ/DAQ offices in Salt Lake City, Utah, provided information on permitted gilsonite and phosphate mining activities in the Uinta Basin. Particulate and VOC emissions are of concern for the gilsonite mines, and only particulate emissions are of concern for the lone phosphate mine in the Uinta Basin, as they are the most sizable. There are three gilsonite mines in the Uinta Basin: Ziegler Chemical (emissions of 12.00 tons per year of PM_{10}, from the latest emissions inventory on file); American Gilsonite (emissions of 87.99 tons per year of PM_{10} and 92.95 tons per year of VOCs, from the latest emissions inventory on file); and Lekas Gilsonite Mine (1.52 tons per year allowable emissions from Utah Approval Order DAQE-648-88). The SF Phosphates Limited Company operates the SF Phosphate Mine, which has a PM_{10} allowable emissions limit of 353.12 tons per year, taken from Utah Approval Order DAQE-140-97.

Controlled burns will yield a large amount of particulates and carbon-based emissions (i.e., CO, CO_2), but due to the temporary nature of these burns, the impacts to the airshed would be minimal. Logging and recreational activities would increase particulate emissions, but these would be expected to be minimal and temporary.

In summary, from a cumulative impacts standpoint, the Proposed Action would not contribute substantially to combustion-related pollutants. All other combustion-related pollutants would arise from mobile sources and would be of a temporary nature during construction. Additional wells development would increase particulate emissions, but these would be partially mitigated by dust suppression. The results of an analysis of similar emissions (Western Water Consultants 1995) indicate that the cumulative particulate impacts from the construction and operation of the Proposed Action would not affect attainment of Class II NAAQS in the Uinta Basin.

5.3.2 SOILS AND WATERSHEDS

Any land-disturbing activity that removes native vegetation and topsoil would adversely affect soil and watershed functions. Soil erosion would be increased due to disturbance associated with oil and gas activities in the region. As indicated in Table 5-4, over 30,000 acres of disturbance would occur if all past, present, and reasonably foreseeable future activities were implemented. The disturbance from these activities results in cumulative erosion, destruction of native vegetation, and invasion of disturbed areas by undesired plant species. Each new development would produce an additional 2 tons per acre per year of soil erosion until the disturbed area is successfully reclaimed. In general, soils in the Uinta Basin are very thin, slow to develop, and difficult to reclaim because of the arid climate and paucity of organic material.

Long-term, non-oil and gas related elements of the RFD scenario (e.g., mining and recreation development) would amount to only approximately 500 acres of disturbance. However, other, present land uses, including the BLM's annual burns (2,000 acres) and firewood sales (5 at approximately 100 acres/sale), disturb up to 2,500 acres annually. In addition, present management at Dinosaur National Monument annually burns approximately 1,000 acres for fuel reduction (Personal communication with S. Petersburg, Fire Manager, Dinosaur National Monument, June 1998). Ashley National Forest presently burns 3,000–4,000 acres annually, primarily for fuel reduction in pinyon-juniper, sage, and ponderosa pine communities (personal communication with R. Moncrief, Fire Manager, Ashley National Forest, Vernal Ranger District, June 1998). Despite their temporary nature, these disturbances also would be expected to increase erosion. Soil losses from prescribed burn areas would depend upon the intensity of each burn, but could approach the rates assumed for areas that have been graded. Over-grazing of high-use areas within the Uinta Basin could also increase erosion and sedimentation in those areas.

The magnitude of soil loss from full RFD implementation can be assessed by comparing additional soil erosion from oil and gas development with background erosion rates in the Green and White River basins. Assuming that each acre is disturbed for an average of 10 years (incrementally recovering toward background erosion rates), the average increase in erosion would be 1 ton per acre per year; therefore, 30,000 acres of disturbance equals 30,000 additional tons per year of erosion. If it also is assumed that all of this erosion is delivered to the White River annually, the increased sedimentation amounts to approximately 1.4% of the estimated annual sediment load (2.2 million tons) carried by the White River (BLM 1991).

In addition, increased soil erosion will be localized and generally transported over long time scales (100< years) as pulses in ephemeral tributaries toward the major stream and river drainages.

5.3.3 VEGETATION, RANGE, AND SENSITIVE PLANT SPECIES

Of the past, present, and reasonably foreseeable future activities analyzed in this chapter, oil and gas development is among the most disruptive to local vegetative habitats, via direct disturbance and slow reclamation of disturbed areas. Furthermore, introduction of non-native, invasive plant species, which often accompanies development, can have significant adverse impacts on native

wildlife dependent upon endemic vegetation species for their survival. In general, such an ecological shift would probably have detrimental impacts on native wildlife species, and would favor non-native and readily adaptive plant species. As indicated in Section 5.3.2, Soils and Watersheds, direct surface disturbances caused by implementation of the RFDs are primarily attributable to oil and gas development (approximately 30,000 acres) and vegetation management by various federal agencies (approximately 6,500 to 7,500 acres/year).

The continued, prescribed burns on federal land in the basin are designed as low-intensity burns to clear understory and weedy species in order to enhance or maintain rangeland productivity. Over the long term, prescribed burns would be expected to improve rangeland conditions. Over-grazing areas within the basin would increase erosion, increase sedimentation, and hinder forage regeneration. However, proper grazing management for sheep, cattle, and big game should minimize erosion.

Surveys for sensitive plant species (USFWS Candidate, Threatened, and Endangered species) are required prior to construction/development of roads, wells pads, and pipeline corridors on federal land. In general, these practices are considered effective in minimizing the potential for impacts to sensitive plant species, so no direct, cumulative impacts from oil and gas development would be anticipated. Likewise, direct impacts from mining or other uses (e.g., grazing, prescribed burns, etc.) would be minor; the endemic plant species are adapted to low-intensity understory burns, and in the absence of more competitive species, they should recover following controlled burns. Indirect impacts from oil and gas development (from the development of roads and pipelines) would result in fragmentation of vegetative communities, which could affect seed dispersal and limit species distribution.

Increased recreational use of areas opened by oil and gas development could also adversely impact sensitive plant species, by increasing OHV traffic and improving access into remote areas for illegal collection of rare plants.

5.3.4 WILDLIFE

5.3.4.1 GENERAL

The predominant cumulative impacts to wildlife resources, including any special status species that may occur in the region (e.g., ferruginous hawk), would be the ongoing, incremental habitat fragmentation, animal displacement, habitat loss, and increasing human presence. Ongoing and planned activities in the CIAA would further reduce the amount of available cover, foraging opportunities, and breeding areas for a wide variety of trophic levels, including big game, raptors, passerines, predators, prey, and other non-game species. Well-drilling and other human activities (both directly and indirectly associated with these projects) would incrementally reduce the productivity of the habitats impacted and increase the human presence and use of the region for, at a minimum, the lives of the projects (up to 40 years). Additional future development, with more intense human activity, could preclude animals from using certain areas altogether. In general, the severity of the cumulative effects would depend on factors such as the sensitivity of the species impacted, the seasonal intensity of use, type of project activity, and physical parameters (e.g., topography, forage, and cover availability).

The number of additional wells and acres of disturbance proposed for the region provides a rough index of the cumulative direct and indirect impacts to wildlife resources, including sensitive species, resulting from oil and gas development. Past, current and proposed gas field development would disturb an estimated 30,000 acres within the CIAA and adjacent Tribal lands, out of a total of 4.9 million acres located within Duchesne and Uintah Counties (see Table 5-4). These land impacts would produce large-scale changes to native wildlife habitats and resident populations. Direct impacts would consist primarily of loss of habitat until project closures and successful reclamation (approximately 10 to 20 years, potentially longer for woody species). More difficult to assess but equally important to consider are the habitat areas indirectly affected by increased human activity where these projects occur.

Based on prominent resource issues and agency concerns, the cumulative analysis for wildlife and sensitive species focuses on mule deer and raptor species within the CIAA.

5.3.4.2 MULE DEER

Cumulative projects or activities examined, which specifically affect the Book Cliffs mule deer herd, include:

1. other ongoing and proposed energy developments in mule deer summer or winter range;
2. the oil and gas favorability classification for the region,[2] which is determined by the BLM to be "Favorability 2, Certainty 3" and "Favorability 3, Certainty 4" (BLM 1984, Karpowitz 1984);
3. potential future leases to the south of the RDG Project Area;
4. possible in-fill activities, to a 40-acre spacing;
5. ongoing livestock grazing; and
6. incremental recreational use and human presence in the region.

Although non-quantifiable, overall cumulative impacts to resident mule deer would qualitatively parallel the impacts discussed for general wildlife resources and would include similar degrees of habitat loss, harassment, and displacement by oil and gas activities (i.e., well drilling and maintenance, road development, laying pipelines).

The majority of direct impacts to mule deer within the Book Cliffs herd unit would occur from ongoing and planned oil and gas development due to the pervasive and dispersed nature of the land disturbance. Concurrent indirect impacts resulting from oil and gas development would include the harassment and increased stress of herds due to greater access by humans into areas occupied by mule deer, including critical winter range. In addition, there could be increased poaching in the area for deer and elk. Climatic factors such as drought or heavy winter snowfall will continue to affect herd viability, but are unpredictable. Other aspects of the RFD scenario, such as gilsonite and phosphate mining, power generation, and the BLM's habitat management activities, would not be expected to impact mule deer or other big game species. Coordinated

[2] Favorability ratings estimate the favorability of the geologic environment to contain oil or gas. The lowest rating is "1" and the highest is "4." Certainty ratings reflect the degree of certainty that the resource is known to exist.

herd and habitat management between the BLM and UDWR would be expected to enhance the Book Cliffs herd's chances for successful recovery in the future.

5.3.4.3 RAPTORS

Cumulative impacts resulting from implementation of the RFD scenario would be particularly important for certain raptor species, such as neotropical migrants (e.g., Swainson's hawk, prairie falcon) that are currently experiencing additional population pressures from external factors both outside and within the Book Cliffs Resource Area unrelated to oil and gas development (Grant et al. 1991, Johnsgard 1990, Nelson [n.d.]). These factors include habitat loss from deforestation, herbicide applications, OHV pressures, and ongoing livestock grazing. These activities have resulted in reduced breeding success, direct mortalities, and declining prey availability. A combination of local, regional, and external change agents are probably impacting the overall populations and reproductive success of breeding raptors and the survival rate of wintering birds. These factors encompass large, complex issues that are applicable to both global and local conditions.

Raptor studies conducted within the Uinta Basin from 1975 to 1985 concluded that population fluctuations in both resident and migratory raptor species appeared to be dependent on prey availability (Grant et al. 1991, Stalmaster 1988). Suitable nesting habitat and appropriate substrates for nests were abundant, and no obvious effects to the populations from weather were documented. The fluctuations in territory size and density indicated that interspecific and intraspecific competition had a minimal impact on the populations (Grant et al. 1991). These studies suggested that any acreage losses in the CIAA would impact raptors' prey bases and incrementally impact raptor populations.

Impacts to foraging habitat from road and well pad construction could possibly degrade the habitat for small mammals and other prey, thereby reducing the carrying capacity for raptors (Nelson [n.d.]). Additionally, raptor body size is directly related to the size of a species' range, which infers a direct link between raptor density and prey availability. Large raptors (e.g., golden eagle) typically consume larger prey than the smaller raptors (e.g., prairie falcon), and large prey animals generally occur at lower densities than smaller prey, requiring a larger foraging radius for the larger birds (Nelson [n.d.]).

Other elements of the RFD scenario that require ground disturbance would have little to no significant impacts on raptor populations in the Uinta Basin because of the small size of these disturbances. However, additional recreational use of the White River corridor would be expected to have the largest incremental effect despite the absence of ground disturbance associated with this activity. This is because of the disproportionate use of the high-value foraging habitat associated with the corridor. However, for some species (e.g., bald eagle), recreational use would not coincide with use by raptors (winter), and impacts would be minimized, whereas impacts for other species (e.g., ferruginous hawk) would increase.

As part of the APD process, it is mandatory that all proposed development sites be examined by the BLM AO to identify potential nesting sites prior to well drilling or road construction. It is the BLM's intent to identify any occupied raptor territories or nest sites that occur within 0.5 miles of

a proposed well, access road, or transmission facility, and subsequently to develop additional protection measures (e.g., avoidance, constraint periods). Therefore, based on these protection measures and agency-directed mitigation, the residual cumulative effect (e.g., increased human presence, habitat fragmentation) from the projects examined for the RFD scenario would be expected to be moderate for area raptors.

In summary, the potential impacts to available habitat for area raptors identified in this cumulative impacts analysis would result in variable impacts and would be somewhat species-dependent, based on size of home range, prey preference, tolerance of human presence, nesting habitat, and foraging radius from the nest site. Direct and indirect effects to raptors would include possible human disturbance of breeding birds, a reduction in the prey base from construction of the road networks and well pads, displacement of birds due to a decline in small mammal populations, and overall habitat fragmentation.

The BLM will continue to coordinate with the UDWR and USFWS during the APD process and the associated environmental analyses.

5.3.5 CULTURAL RESOURCES

Because federal law requires that development of oil and gas facilities (e.g., wells, roads, pipelines) be preceded by surveys for cultural resources, direct, cumulative impacts are expected to be minimal. The greater cumulative threat to cultural resources would be indirect: in the form of increased public access to remote areas concurrent with increased recreational use of these areas. Collection and vandalism would be expected to increase over present levels.

5.3.6 PALEONTOLOGICAL RESOURCES

Oil and gas development has been and will be the primary activity affecting paleontological resources in the CIAA due to the bedrock disturbance associated with construction of access roads, well pads, and pipeline gathering and transmission systems. The Green River and Uinta Formations are the primary fossil-bearing formations in the Uinta Basin, occurring near the surface throughout Duchesne and Uintah Counties. It is possible that, as ground disturbance activities are preceded by surveys, new discoveries will be made both before and during construction. However, it is also possible that, despite the fact that surveys for paleontological resources are conducted prior to ground disturbance where bedrock may be exposed, some fossils would be destroyed. Because fossils can be accidentally destroyed without notice or awareness, the net loss or benefit of implementation of the RFD to paleontological resources is not possible to quantify.

Gilsonite mining also has the potential to disturb or destroy paleontological resources. However, due to the narrow veins and relatively simple process of extraction of gilsonite contained within the Uinta and Green River Formations (i.e., no removal of overburden), the impacts are expected to be minimal. Phosphate mining at the SF Phosphate Mine is localized and disturbs minor amounts of bedrock relative to the CIAA. Together, gilsonite and phosphate mining have the potential to affect only a few hundred acres annually within the Uinta Basin, and the occurrence of fossils in these disturbed areas is expected to be rare.

5.3.7 RECREATION

It is likely that recreational floating on the White River will increase in the future, particularly as natural landscapes diminish throughout the region. To-date, operators like Coastal and Enron have committed to minimize potential impacts to White River boaters by restricting their development within areas visible from the river. However, there are multiple lease holders and various land owners (e.g., private and state) in the White River corridor whose mandates do not emphasize recreational tourism. Retamco Operating Company has proposed one well on federal land in Section 31, T10S, R23E. Increasing development of wells in this township, including additional development of Section 32 beyond what is included in the Proposed Action, would eventually begin to detract from the experience of White River recreationists who choose to hike out of the river corridor. Consequently, maintenance of the natural and remote character of the White River corridor is uncertain.

BLM activities that encourage recreation by development of recreational facilities would have the most direct effect on recreational use of the area. As alluded to in this EIS, the Proposed Action, and other similar RFD activities, would indirectly affect the use of the CIAA by grading access roads into remote areas that otherwise would not be frequently visited. However, the remoteness and size of the CIAA suggests that recreational use would be widely distributed and infrequent at locations that have not previously been identified as significant recreational resources. The trend in increased recreation in the area would be expected to be concentrated along the White River and other developed areas such as those mentioned in the Section 5.2.5, Other Resource Uses. Recreation would be widely dispersed elsewhere in the CIAA. Therefore, oil and gas development in concentrated use areas would have the greatest effect on the recreational opportunities of visitors. Other activities described in the RFD scenario would be expected to have little, if any, effect on recreation.

5.3.8 VISUAL RESOURCES

Several reasonably foreseeable future actions have potential to contribute to the cumulative visual effects analyzed for this project. Several natural gas well pads proposed recently by Coastal Oil and Gas Corporation within the Natural Buttes Unit would be located on Archy Bench, which lies within a 5-mile radius of the Goblin City View Area. The EA prepared for the Natural Buttes well field expansion concluded that proposed painting of well pad facilities to blend with the surrounding landscape should be sufficient to eliminate any visual impacts caused by these facilities (BLM 1997). Facilities proposed by Enron Oil and Gas Company within the Chapita Wells unit would be located a distance of at least 6.5 miles from the Du View Area and would not be discernable to the naked eye. Development of additional well pads and access roads in Section 31, T10S, R23E by Retamco Operating Company could affect visual resources from Goblin City, although less than 10% of this section is visible from that viewpoint.

Visual resources from the Goblin City View Area would be incrementally impaired by access roads and well drilling for the life of the Proposed Action and could have minor effects beyond the life of the project depending upon the success of reclamation. Only one well has been proposed for Section 32 of T10S, R23E and analyzed in this EIS. Should the BLM grant access across federal land, additional wells could be developed without BLM oversight of well and

access road placement. Given that approximately 30% of the land in Section 32 is visible from the Goblin City View Area, it would be expected that a proportional percentage of disturbed land could be visible. For example, wells developed on 80-acre spacing would disturb 11.7 acres of land and would require 2.20 miles of access roads, given the same assumptions used for the Proposed Action. Without consideration of viewer sensitivity from the Goblin City View Point, 3.5 acres of well pads and 0.66 miles of road segments could be visible from Goblin City. The presence of these facilities within 1.50 miles of the View Area would substantially degrade the expectations visitors have for a remote and relatively natural landscape.

Overall, the projects described above would impact the visitor experience at the Goblin City View Area because a number of unscreened access roads and well pads could be seen from the View Point. These impacts would be expected to increase in the future as increasing recreational use of the Goblin City View Area conflicts with additional well development within the viewshed.

The White River Corridor is a Class II VRM area, indicating that changes to the viewshed should not be evident. The BLM generally restricts oil and gas along this corridor so as not to degrade this resource.

5.3.9 WILDERNESS CHARACTERISTICS

The Uinta Basin has been an area of interest to the oil and gas industry since ca. 1950, and this portion of the basin has seen oil and gas exploration, development, and production since the 1960s. To the west of the Project Area, the Myton Bench area has been developed for oil and gas production. To the east, the Coyote Bench/Kennedy Wash area is producing natural gas.

Oil and gas exploration, development, and production include the construction of roads and well pads, pipelines, compressor stations, and other needed facilities. Thus far, this development has contributed to impacts to the roadless and natural character of many lands in the Uinta Basin, and thus their wilderness characteristics. With the development of the RDG Project Area, additional lands will be impacted.

In the Project Area are portions of three areas with wilderness characteristics: the White River inventory area, the Utah Wilderness Coalition's (UWC's) White River proposed wilderness unit (which the BLM has determined likely has wilderness characteristics), and the UWC's Lower Bitter Creek proposed wilderness unit (which the BLM has determined likely has wilderness characteristics).

The Proposed Action plans the construction of approximately 15 miles of access roads and 50 well pads in the White River inventory unit and UWC areas. These areas not only would lose their wilderness characteristics but also would add to the cumulative impact to roadless areas and natural character of the Uinta Basin. Any use of the well roads by OHV users would also incrementally decrease opportunities for solitude and primitive recreation near the boundaries of the inventory area and UWC proposed wilderness units.

5.3.10 SOCIOECONOMICS

In the near term (10 to 20 years), the social and economic vitality of Duchesne and Uintah Counties will continue to rely heavily on the revenue and employment related to oil and gas production. The per-capita economic value of extractive, resource-based economies (including mining) is generally higher than service, government, recreation and tourism, or retail and wholesale trade sectors. Oil and gas operations on federal land will continue to provide the counties with a substantial portion of its operating revenue. However, resource-based economies also are short-term and are inherently subject to fluctuations in the market value of these commodities. The proportionately large dependence of the Uintah and Duchesne economies on the direct and indirect benefits of natural resource extraction and production leaves these communities exposed to periodic downturns when economic conditions change. In addition, the nature of commodity production dictates that high levels of production would not be sustainable over the long term.

In contrast, the tourism and recreation sector provides a growing number of direct and indirect economic benefits to Uintah and Duchesne Counties. As regional populations increase, it would be expected that county revenue from this sector would continue to increase in the future. Although these jobs are often seasonal and lower paying than commodity-based jobs, recreation and tourism represents a long-term, sustainable economic growth area for Uintah and Duchesne Counties.

Based on the RFD scenario, royalty revenue from oil and gas operations would continue to be generated. Revenue coming back to Uintah and Duchesne Counties would be expected to grow over the next 10 to 15 years, before tapering off as this cycle of drilling and production of oil and gas resources declines. Royalty revenues would continue to be complemented by *ad valorem* taxes paid directly to the counties.

Employment opportunities in the oil and gas industry would increase until full construction is reached in approximately 10 years and would decrease thereafter as drilling tapers off. Some of these jobs would be converted to operations and maintenance jobs, but it would be expected that after drilling has peaked, there would be a net loss in oil and gas related employment.

Gilsonite and phosphate mining would continue to provide employment for a small sector of the economy but similarly would be subject to market downturns and would decrease as these resources are depleted. Power generation at the Bonanza Plant would be expected to continue to provide a small number of long-term, local jobs. BLM activities directed toward enhancement of recreational opportunities in Uintah and Duchesne Counties (such as development of recreational resources or habitat management for big game) would be expected to increase the growth of this industry.

5.3.11 NOISE

Noise from heavy equipment operation, blasting, drilling, and blowdown from the Proposed Action and RFD would contribute to cumulative effects because complete mitigation of noise from construction and operation of oil and gas development is not possible. However, because

the majority of proposed developments are located in remote areas away from sensitive noise receptors, the direct effects to humans would be minimal. Wildlife populations occupying the development areas for the Proposed Action as well as present and future projects, would be the receptors most likely to be affected. Wildlife affected by noise would avoid sources of persistent noise; however, where less predictable noise occurs (blasting or blowdown), stress to wildlife would occur.

5.4 CUMULATIVE IMPACTS RELATED TO ALTERNATIVE 2 – ADDITIONAL WILDLIFE CONSIDERATIONS

The cumulative impacts associated with Alternative 2 would be similar to those described for the Proposed Action, though the scope and degree of intensity would likely be less due to the greater variety of construction and production practices employed. Special construction and operational methods may also be used to reduce potential environmental impacts. Cumulative stresses to big game species and special-status species would be reduced under this alternative, compared to the Proposed Action, and restrictions on development in areas with high soil erosion potential would reduce cumulative soil losses in the CIAA. Cumulative social and economic impacts would be similar to the Proposed Action given that the same amount of wells would be drilled under Alternative 2. Royalties and revenue from oil and gas development would be similarly generated over the next 10-15 years and then taper off as the resource is depleted. Employment would peak in 10 years and within another decade or so there would be an overall net loss of oil and gas related jobs.

5.5 CUMULATIVE IMPACTS RELATED TO ALTERNATIVE 3 – ADDITIONAL ENVIRONMENTAL CONSIDERATIONS

Under Alternative 3, cumulative impacts in the CIAA would be similar to those described for Alternative 2 but further reduced in scope and intensity. The preservation of approximately 10,200 acres in the White River inventory area and the UWC proposed wilderness units (with the reduction of well construction within the Project Area from 423 to 373) would reduce the cumulative, negative impacts on vegetation and wildlife populations within the CIAA. Visual and recreational resources would be preserved in these areas, and there would be further reductions in the rate of soil erosion in the CIAA. Social and economic cumulative impacts would be slightly reduced. Royalties and revenues would be decreased and fewer workers would be employed for construction and maintenance.

5.6 CUMULATIVE IMPACTS RELATED TO ALTERNATIVE 4 – NO ACTION

Under Alternative 4, No Action, the trajectory for continuation of existing land use and resource consumption is not subject to the cumulative impact analysis for this EIS. Continued land use and consumption would clearly have an impact on resources, but the dispersed nature of the construction, coupled with the comparatively low rate of construction, would produce a comparatively low level of environmental degradation, a level not unforeseen in association with past and existing projects in the Project Area.